



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/759,247	01/20/2004	Chun Ho Fan	50626.66	7081
35510	7590	05/19/2005		
KEATING & BENNETT, LLP 10400 EATON PLACE SUITE 312 FAIRFAX, VA 22030			EXAMINER SOWARD, IDA M	
			ART UNIT 2822	PAPER NUMBER

DATE MAILED: 05/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/759,247

Applicant(s)

HO FAN ET AL.

Examiner

Ida M. Soward

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-10 and 13-16 is/are rejected.
- 7) ☒ Claim(s) 3,4,11 and 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1-20-04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the application filed January 20, 2004.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 7, 9 and 15-16 are rejected under 35 U.S.C. 102(e) as being anticipated by Hoffman (US 2005/0051859 A1).

In regard to claims 1 and 9, Hoffman teaches an integrated circuit package 500 comprising: a substrate 102A (page 5, paragraph [0081]) having conductive traces 110-1 & 110-1A (page 6, paragraph [0088]) therein, the substrate 102A including a cavity 502 (page 5, paragraph [0080]) therein; a semiconductor die 104 mounted to a first surface of the substrate 102A, in a flip-chip orientation such that a sensor portion 106 of the semiconductor die 104 is aligned with the cavity 502 and conductive interconnects connect pads 108 & 108A of the semiconductor die 104 to the conductive traces 110-1 & 110-1A of the substrate 102A; an underfill 118A material surrounding the interconnects 108 & 108A; and a plurality of conductive balls 116 & 116A disposed on

Art Unit: 2822

the first surface of the substrate 102A, the conductive balls 116 & 116A being electrically connected to the conductive traces 110-1 & 110-1A such that ones of the conductive balls 116 & 116A are connected to ones of the pads 108 & 108A of the semiconductor die 104 via the conductive traces 110-1 & 110-1A (Figure 5, pages 5-6, paragraphs [0079]-[0091]).

In regard to claim 7, Hoffman teaches the sensor portion 106 of the semiconductor die 104 exposed to air 122 (Figure 5, page 3, paragraph [0047]).

In regard to claim 15, Hoffman teaches singulating 414 the integrated circuit package 500 from a remainder of a strip of gang-fabricated packages (Figure 4).

In regard to claim 16, Hoffman teaches mounting the semiconductor die 104 including locating the conductive interconnects 108 & 108A on to the semiconductor die 104 and then attaching the die 104 to the conductive pads on the substrate 102A (Figure 5).

Claim Rejections - 35 USC § 103

Claims 2, 5, 10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman (US 2005/0051859 A1) as applied to claims 1, 7, 9 and 15-16 above, and further in view of Glenn et al. (US 6,528,869 B1).

Hoffman teaches all mentioned in the rejection above.

However, Hoffman fails to teach the semiconductor die being a micro electro-mechanical system integrated circuit chip and a lid disposed on a second surface of the substrate and covering the sensor portion of the semiconductor die.

Glenn et al. teach a semiconductor die 16 being a micro electro-mechanical system integrated circuit chip (column 1, lines 12-14) and a lid 24 disposed on a second surface of a substrate 12 and covering the semiconductor die 16 (Figure 1, column 2-3, lines 33-67 and 1-48, respectively).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the integrated circuit package structure as taught by Hoffman with the integrated circuit package having a semiconductor die being a micro electro-mechanical system integrated circuit chip and a lid disposed on a second surface of a substrate and covering the semiconductor die as taught by Glenn et al. to define the closed cavity within which the semiconductor die is enclosed (column 3, lines 32-41).

Claims 6 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman (US 2005/0051859 A1) as applied to claims 1, 7, 9 and 15-16 above, and further in view of Thomas (US 2004/0084738 A1).

Hoffman teaches all mentioned in the rejection above.

However, Hoffman fails to teach the underfill comprising a polymeric encapsulant.

Thomas teaches an underfill 701 comprising a polymeric encapsulant (Figure 7, page 5, paragraph [0067]).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the integrated circuit package structure as

taught by Hoffman with the integrated circuit package having an underfill comprising a polymeric encapsulant as taught by Thomas to reduce the mechanical stress of the solder joints (page 5, paragraph [0067]).

Allowable Subject Matter

Claims 3-4 and 11-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to further show the state of the art with respect to integrated circuit packages:

Camenforte et al. (US 2003/0151148 A1)	Chao et al. (US 6,483,187 B1)
Camenforte et al. (US 6,744,125 B2)	Ho et al. (US 6,469,897 B2)
Choon Kuan et al. (US 2004/0080046 A1)	Ito et al. (6,114,755)
Mess et al. (US 6,380,631 B2)	Yang et al. (US 2005/0046039 A1)
Wang (US 6,879,031 B2)	Schueller et al. (US 2001/0001505 A1).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ida M. Soward whose telephone number is 571-272-

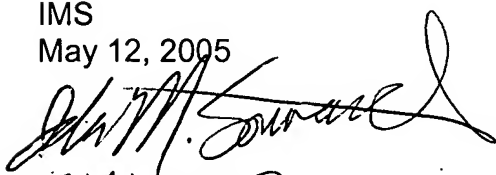
Art Unit: 2822

1845. The examiner can normally be reached on Monday - Thursday 6:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

IMS
May 12, 2005


AU 2822